HIV in India

Curriculum for 9th Standard Science
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Introduction:
The AIDS crisis is far from over. As of 2006 there are an estimated 34-47 million people infected with HIV worldwide, with approximately 4.3 million new infections annually (United Nations Programme on HIV/AIDS, 2006). In India, the estimate is 2-3.1 million people infected with HIV, with 88.7% of these being 15-49 years of age (National AIDS Control Organization, 2007). This is a topic in which every adolescent, regardless of ethnicity or native language, must be literate.

The goal of science and specifically biology education is to give students a deeper understanding of life on earth and their relationship to all living things. The biology curriculum focuses on systems and interdependence of life and components of life. This includes a study of bacteria, viruses and diseases of humans, and must highlight HIV in particular.

A specific unit on HIV should be included in a biology curriculum for these reasons:

1. The history of the AIDS epidemic provides an excellent case study of modern epidemiology.
2. The process of HIV infection ties together many vital components of the existing biology program, such as DNA/RNA replication, transcription, protein functions and the intricacies of the immune system.
3. Much of the news about AIDS today concerns new treatments and vaccines. An understanding of the mechanics of HIV will give students a better understanding of the latest developments.
4. AIDS/HIV prevention education is required in all Wisconsin schools. This requirement is usually accomplished in Health class. However, these classes vary greatly from teacher to teacher as to what is covered, and tend to focus only on a few broad prevention strategies, i.e. abstinence and/or condom use. The science behind HIV infection is usually ignored completely.
5. There is still a stigma attached to HIV infection. Prejudices and moral judgments about people with HIV are too common. While science is not immune from these particular
pathogens, the biology classroom can be a vehicle for current, factual information about this disease which cannot be disputed.

6. Every student must take science in school. This includes the marginalized students who are historically and statistically more likely to become infected with HIV.

My students keep weekly dialogue journals. Before beginning this unit, I will ask students to write about their impressions of AIDS, what they have already learned, and how AIDS is talked about in their families or communities, if at all. This is to begin assessing the range of student schemas in order to address possible taboos and misconceptions. Dialogue journals will also be used throughout the unit to gauge how students are reacting to the information.

A power point presentation is included with this lesson. It is recommended for use at the conclusion of the unit as a review and to address any issues not yet raised. It could be used as an introduction to the unit, or select slides could be shown at the start of each day to introduce the topic being explored during that class.

**Goals/Objectives:**

Students will be able to:

1. Describe the relationship between previous topics of study - cells, DNA, genes and bacteria - and HIV.

2. Describe the process used by HIV to infect and reproduce within a host.

3. Demonstrate prevention strategies and a knowledge of treatment options.

4. Display appropriate sensitivity toward people living with HIV.

5. Use technology - Internet and video - to explore the extent of the AIDS pandemic.

6. Articulate differences in cultural norms regarding AIDS.

7. Express through written and spoken English a thorough understanding of the vocabulary associated with the AIDS pandemic.

8. Display appropriate social interaction and support during collaborative group work.

9. Improve their language and study skills in the realm of biology.

10. Teach others - including their peers, families and communities - about HIV prevention skills.
The lessons:

Concept Mapping/Intro to HIV/AIDS
To kick off the unit on HIV/AIDS, the class will create a concept map with “AIDS” as the central concept. This is an activity that my classes have done at the start of many units to assess student knowledge and interest. This time it should also draw out some of the stereotypes and insecurities associated with the disease. We will take time to discuss as a class each point raised.

Students may not know how to approach these subjects. To further introduce the subject, teachers may show the movie Phir Milenge (Balaje & Pius, 2004). This movie is a fictional account of a woman, played by Shilpa Shetty, who discovers she is HIV positive.

Transmission Tracker
This activity illustrates the spread of HIV, the problems faced by epidemiologists, and a review of acid-base chemistry. Each student is given a beaker of clear liquid. They are instructed to mingle, and to pour their fluid into other people’s beakers, then back into their own at least 3 times. The teacher also has a beaker of clear liquid and demonstrates an interaction with another student.

Unbeknownst to the students, all the beakers originally contain water, except one. It contains sodium hydroxide, a strong base. When an indicator solution is added, a base will turn pink. After everyone has exchanged fluids, add the indicator to all the beakers. Since most beakers have come in contact with the sodium hydroxide, most will turn pink. These people are infected with HIV.

After the activity proper, students will be told about how this represented the transmission of HIV. Students then try to figure out the route of disease transmission. They do this by interviewing other students about their fluid exchange partners, and drawing diagrams with arrows to show the suspected path of HIV. The instructor will model an interview with a student, and show how to begin the diagram.

After students have completed interviews and diagrams, discuss the outcomes as a class. Diagrams, probably very different, will be compared and discussed.

Pre-lesson preparation: Carefully combine 4g of sodium hydroxide (NaOH) pellets with 100 mL distilled water in a 250 mL beaker, and keep it separate from other beakers. Pour 100 mL distilled water in 250 mL beakers, 1 beaker for each student in the class. The indicator solution is phenolphthalein solution.

Models: DNA, RNA, HIV, T-Cells
Students are to use construction paper and markers to create paper models of DNA, RNA, HIV and a T-Cell. They may use as references books, CD-ROMs or the internet. One goal is to get each of these components in the correct scale in relation to one another. This is also a review of DNA, RNA and the immune system from previous biology units. Students will work in groups
of three or four on this activity, using our standard biology class roles of Facilitator, Researcher, Attendant (materials gathering) and Time Manager. The models will be used in the next activity.

**Role play of HIV integration using models**
Using the models they created, students will plan and perform a skit about how HIV enters a T-Cell and takes over its genetic code. Again, other references may be needed to find the correct series of events. They should discover that they need more characters than the 4 required models. The students may take on multiple roles or recruit students from other groups. The skit is to be scripted and rehearsed prior to its presentation to the class. This activity again reinforces the group process, and provides opportunities to practice spoken English and presentation skills.

**History of HIV (movies or Internet research)**
Students will view the movie *And the Band Played On* (Pillsbury & Sanford, 1993) to see how HIV was discovered and how the world reacted to the disease. Students will use this information and Internet research to write a short essay about the emergence of HIV. They will be encouraged to find out about the first years of the epidemic in India. Students will submit their written essays for critique, and also have the opportunity to share their findings verbally with the class.

**Role-plays**
After some careful and deliberate modeling with the teacher, students will perform role plays about negotiation skills. One student will play the person encouraging unsafe behavior, while the other will play him or herself trying to negotiate their way out of the situation. Possible scenarios include: boyfriend/girlfriend pressure to have sex; talking a younger sibling out of unsafe choices; identifying unsafe behavior at parties; peer pressure to use drugs; encouraging condom use/purchase; encouraging HIV testing.

One class period will be spent modeling and practicing such role plays. The teacher will assign the scenario and the roles, insuring that everyone plays each part at least once. Every day after this begin the class with one or two quick role plays, participants chosen by the instructor. This is such an important skill that time needs to be devoted to it every day.

**Condoms - permeability tests and use instructions**
Discussion of condoms can be controversial and offensive to some people. Any decision about how far to go with the discussion will be based on the students’ feedback in dialogue journals and class discussions. Since they are rooted in scientific facts, there does not have to be a discussion about the morality of condom use. Students are also working in groups, so if a student is uncomfortable with the subject matter, they can take a role that does not require handling or speaking publicly about condoms.

In a previous unit students learned about semi-permeable membranes and how to detect certain chemicals in solution. For this activity students will work in groups to perform an experiment comparing the permeability of latex condoms to “natural” condoms made from sheep intestine. The condoms are filled with solutions of salt, glucose and starch, then securely tied at the open end. The full condoms are then placed in individual cups of distilled water, and allowed to sit for 10-20 minutes. The condoms are removed and the distilled water in the cup is tested for the
presence of salt, glucose and starch. Students will hopefully find that none of these chemicals permeated the latex condom, while all of them can permeate the “natural” condom. Comparisons are then drawn between the sizes of the molecules we used and the size of HIV. Their findings are written down, graphed and presented to the class.

This activity reinforces many traditional biology lab skills while demonstrating a very relevant fact about the efficacy of condoms. It also gives students some exposure to real condoms that they can touch, open and unroll.

Another activity has 12 steps for using a condom printed out on separate full-page paper cards. The steps in correct order are:

1. Talk about using condoms
2. Check the expiration date
3. Open the package carefully
4. Erection
5. Squeeze the tip of the condom
6. Roll condom all the way down
7. Intercourse
8. Ejaculation
9. Hold the condom at the base of the penis
10. Withdraw
11. Carefully slide the condom off
12. Throw condom into the trash

Students work in groups of 12, each person getting one card, to arrange them in the correct order.

Besides teaching the obvious, there is a great deal of vocabulary to be learned here. Students must read and understand their own cards and the cards of everyone else in order to determine their place in the order. Some preteaching of vocabulary may need to occur.

**Person Living with AIDS**

Most major cities have AIDS service organizations that provide HIV prevention information and services for people living with HIV. Besides being excellent sources of current information and teaching materials, such organizations can often help connect schools with people living with HIV who are willing to speak publicly about their situation. Of course, this should be arranged well in advance.

Prior to the visit, students will write specific questions they would like to ask a person living with AIDS. Questions should be pre-screened to insure their appropriateness. They will then be typed up and the list distributed to all students. When the guest arrives, students may ask any question on the list, or they may ask anything else. This is to give students practice writing concise questions, and reading what they and their peers have written. It also helps to prevent gaps of silence when students may not be able to think of a question for the guest. They may ask questions not on the list simply because new ideas may arise at the moment.

Meeting someone living with HIV/AIDS is one of the most important components of AIDS education. Students can see for themselves that this disease affects real people with feelings,
families, friends, dreams and goals. This has more impact on changing attitudes than any other activity or educational strategy could.

**Final project**

Students will have a choice of a final project to conclude this unit. The choices are:

1. Work in groups to plan, script and create a video project. The guidelines will be: every student must have a speaking role, every group will turn in a written script in a specified format prior to shooting, and the video must appropriately and creatively convey information about the science and/or prevention of HIV. The written script not only provides more writing practice, but it makes shooting more efficient when time is a huge constraint. If availability of video equipment is an issue, students can instead perform their script live in front of the class.

2. Individually write a research paper integrating the major themes of this unit. The paper should be 1000 – 2000 words and include at least four unique references with full citations.

3. Individually or in pairs create a work of art that integrates the themes of this unit. A detailed proposal of the project should be submitted in advance to insure that it is of sufficient quality and rigor. Simple posters or Power Point presentations are not appropriate, but a series of posters, sculptures or multi-media works could be.

**References**


